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THE FORESTER.

VOLUME II. MARCH 1, 1896. No. 2.

THE FORESTER.

An Illustrated Journal Devoted to Forestry.

Official Organ of the New Jersey Forestry Association. Issued six times a year. Each issue contains sixteen pages of short articles pertaining to Arboriculture, Sylviculture, the Preservation of Useful Birds, the Destruction of Harmful Insects, the Establishment of Parks and Reservations, Water Supply, Forest Legislation, Forest Influences, Forest Products, etc., etc.

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Edited by JOHN GIFFORD, Mays Landing, N. J.

CHOPPING wood is an art. All woodmen agree that there is a "nack" or "sleight" about it. The man who leaves a "fox-eared" stump is a hacker and not a chopper. Usually there is very little that is commendable in the ways of woodmen. When they are careful, however, they should have the credit of it. It is quite the custom in the pine woods of Southern New Jersey to leave seed trees, and, what is still more commendable, they leave the smooth bark (*Pinus echinata*) and not the rough bark pine (*Pinus rigida*). This is practising forestry in a very crude way. A few choppers burn the limbs after them—that is, they fall a strip of trees to the left, then the neighboring strip to the right, so that the tops and limbs form a windrow. If the wind is right they burn it and in that way reduce the danger from fire in summer and destroy what may become a breeding place for pestiferous insects. A good chopper leaves the proper kind of stump. If it is pine there is no difference, since pine produces no coppice growth of value and the stump soon decays. If it is oak or chestnut it is an important matter. A good chopper cuts a tree close to the ground and leaves a clean, sloping top to the stump. If the bark is not split and the cut is clean it will not rot, and the coppice growth which follows will be healthier and in ten or fifteen years fit for fuel. There is no reason for using such large firewood. Although more tedious to cut in the woods, there is more of it in the same bulk, it is more easily handled, easier to cut and split on the woodpile, dries quicker and makes a quicker and hotter fire.

IT is a significant fact that the Raritan valley, a region which has been practically deforested, suffered the most from the flood on the seventh of February.

To sum it all up, fires can be reduced to a minimum by removing the causes. Many of these causes are avoidable and will not exist if there are the proper kind of laws with ample machinery for their enforcement. The few fires which are unavoidable can be extinguished in their incipiency if there is a warden present who knows just how and what to do.

Every agricultural college ought to own and properly care for the forest on at least one hundred acres of land. It should own at least a sample wood-lot where students may learn at least a few facts in relation to this important part of every up-to-date farm.

Prehistoric Botany.

BY H. BROOKS.

Among the wild products of our woods are many small fruits and nuts upon which though we call them edible, we place little economic value. In the forests of the Old World these very fruits, or others nearly related to them, are often staple foods of the natives and have been so since prehistoric ages. Some interesting facts concerning the value primeval man set upon them may be gleaned from Dr. Georg Buschan's Vorgeschichtliche Botanik der Cultur– und Nutzpflanzen der Alten Welt. [Prehistoric Botany of the Economic Plants of the Old World.] His first researches were restricted to Germany, and their result submitted to the faculty of the Universsty of Breslau. To quote from their judgment upon it:

"The author has prepared his thesis from the ethnological standpoint rather than from the botanical, and has endeavored to give a history of the civilization of Germany as far as such is reflected in the cultivation of certain plants." As the title conveys, the present work covers a far larger field. Two hundred and forty-five species are discussed, including many of our garden vegetables and orchard fruits, herbs, grains, grasses and such wild forest products as have been above mentioned. Each plant is traced throughout its history in so far as it has been of economic use to the peoples of antiquity.

From Scandinavia to Italy the hazelnut was a valued food to the races of Neolithic, Bronze and Iron Ages. Among the piles of shells excavated at Robenhausen, Switzerland, were found the rounded stones whose indubitable marks show them to be the same with which the ancient Lake-dwellers cracked their nuts ages ago. The empty shells of beech nuts are also found in great masses among the ancient settlements of Middle Europe. This beech (*Fagus sylvatica*) was at that time distributed throughout the European continent excepting the northern part of Scandinavia, Southern Spain and Russia. It is supposed that the nuts were pressed for their oil then as they are now.

It is a curious circumstance that no chestnut shells are found among the remains from the Bronze Age in Northern Italy, although the Lake-dwellers used the wood for their piles. In Spain and Southern France the finds have been numerous. It is supposed that the climatic conditions of the Valley of the Po did not favor the fruition of the tree in those early times. Homeric traditions describe the chestnut as the staple nourishment of certain tribes of ancient Greece. The Greeks confused this chestnut (*Castanea vesca*) with a native oak (*Quercus Ægilops*), which it closely resembles. They accordingly wrote of the tree as a variety of oak. Theophrastus describes the so-called "acorn" as a round nut as sweet as figs and dates both in its wild and cultivated state. Aristophenes mentions it as a delicacy suited to banquets, and Plato recommends the still popular roasting of chestnuts. On the walls of Pompeii the chestnut is often pictured. The Romans knew eight varieties. Their method of cooking the nuts was a slow steaming. They are said to have first introduced it in the countries north of the Alps. This fixes the original home of the chestnut in the southern peninsulas of Europe.

The seed of the Black thorn (*Prunus spinosa*) is found among *Neolithic* remains in many parts of Europe. Although it seems incredible that any people could really eat this fruit, a writer of the twelfth century mentioned the Sloe among the fruit trees* of Germany. It is likely at any rate that the ancient races used the seeds in the preparation of an alcoholic drink like the *vino di prugnola* that is made in Italy at the present time.

The early use and cultivation of the apple form one of the most interesting discussions of the book. It is doubtful whether the tree was known to the ancient Egyptians. No apple seeds, or any fruit are found in the tombs, neither is there any pictorial representation of

* Obstbaume, *i. e.*, bearing edible fruit.

the tree. It is recorded, however, that Rameses II made extensive plantings of a fruit called *dapih*, of which his successor, Rameses III, gave 848 baskets to the priests of Thebes. This word *dapih* has a striking similarity to the word for apple in the Semitic languages. It is suggested that the tree was a rarity in Egypt, imported by the king, who dutifully offered the fruits to the priests. In Greece, the apple is supposed to have been unknown until it was introduced from Italy by the Romans. This is indicated by the Greek name which seems to be derived from the Latin *malus*. In the author's opinion, the wild apple was not indigenous to Greece in early times. To quote from his work (page 167):

"Homer speaks in his poems* of a variety of apple that could be kept throughout the year, by which a winter apple appears to be meant. However, as it can hardly be assumed that such a high state of fruit culture had been attained at that time, Koch rightly judges these passages to be a later insertion." A reference to the passages themselves will show the author's reasoning to stand upon a very slender foundation. It is a poetical description of the garden of King Alcinous: "And there grow tall trees blossoming, pear trees and pomegranates, and apple trees with bright fruit, and sweet figs, and olives in their bloom. The fruit of these trees never faileth, winter or summer, enduring through all the year. Evermore the west wind blowing brings some fruits to birth and ripens others. Pear upon pear waxes old and apple on apple; yea, and cluster upon cluster of the grape and fig upon fig."† Clearly this treats only of the happy succession of fruits in this wonderful garden, and no more of winter apples than of winter pomegranates, figs and olives. The proof of the later insertion of the passage must be sought elsewhere.

Whatever its place in ancient Greece and Egypt, the apple was well known to the Romans from earliest times and largely cultivated by them. Even the Lake-dwellers are supposed to have planted the crab-apple (*Pirus Malus*) which they used in great quantities. Two varieties have been made out from careful measurements of the relative sizes of cores of specimens found in Austria, Switzerland and Italy. Dr. Buschan writes: "I hold the smaller apple with the large core to be the native product of Swiss soil, the larger to be a variety already in the first stages of cultivation and introduced from the East at the time of the migration of these Lake-dwellers. This assumption seems to be the more justified because of the philological proofs, that Celts, Germans and Slavs knew the apple before their separation, and had probably already attempted its cultivation. I do not wish to overlook the fact, however, that wildings of a considerable size may be found in our woods to-day."

The wild-cherry (*Prunus Padus*), unknown in Greece, was distributed over all of Middle Europe and Siberia. Herodotus tells of a tree called *Ponticum* upon the fruit of which lived the Argippeans, a race in the southern Urals. He describes their method of pressing the fruit through cloths The thick, dark juice they obtained was called "*achi*." and they drank it mixed with milk. The Bachkiers, the presumed descendants of the people Herodotus knew, treat the wild-cherry in precisely this way and call the juice "*atschni*." This seems to identify the tree *Ponticum* with the wild-cherry of to-day and proves its time-honored use.

Again, in the case of the dogwood (*Cornus mas*), it is Greek literature that presents some interesting facts. Homer praises the lances made of its hard, dark wood, and from him we learn that the fruit was fed only to swine. Its name did not distinguish it from *Prunus avium*, a member of the almond family. In Italy the fruit is eaten raw by the peasants to-day, and was a favorite food with the prehistoric races of that country.

The numerous seeds of the elder (*Sambucus nigra*) found in some of the

*Odyssey VII 115, XI 589.

†From prose translation of Butcher and Lang. The second passage is only one of the iteratives so common in Homer of the first sentence in the quoted passage.

ancient settlements suggests that the custom of making sauce of elderberries, still prevalent among the Swiss peasants, is of early origin.

The bilberry (*Vaccinium Myrtillus*) was known to the Lake-dwellers, as proven by the seeds found mixed with those of poppy (*Papaver somniferum*) and raspberry (*Rubus Idæus*) in the kitchen-middens of Robenhausen. The berry was either unpopular or scarce, as few traces of it have been found.

These notes can but give an inadequate idea of the wealth of curious and interesting facts contained in Dr. Buschan's work. It should be stated, perhaps, that the book is written in a style too heavily erudite to be very readable. The student in these lines will find it admirably arranged for reference.

Value of Forests.

From Daily State Gazette, Trenton, N. J., Jan. 16, 1896.

In the auditorium of the State Schools, yesterday evening, an interesting lecture on "The Relation of Forests to the Surface of the Country" was given under the auspices of the State Board of Agriculture, by Dr. Joseph T. Rothrock, Forest Commissioner of the State of Pennsylvania. Dr. Rothrock's lecture was preceded by a few remarks on "Damage from Forest Fires in New Jersey in 1895," by Prof. John Gifford. The two lectures were highly instructive and were heard by a large and appreciative audience, among which were the members of the schools.

Professor Gifford illustrated his talk with a map of New Jersey, showing the vast amount of territory swept by forest fires during 1895. The fires have been principally in South Jersey, among the pine and cedar forests, devastating land to the extent of 120,000 acres. The loss is estimated at $10 per acre. This made the total loss to the State from forest fires amount to over $1,000,000 in a year. The result of these fires, besides the immediate damage done, was shown to be most disastrous. They destroyed not only great tracts of timber, but also houses, outbuildings, cranberry bogs, and greatly lessened the supply of game in the neighborhood. Besides this, Professor Gifford said that their effects were bad, because when the trees had been burned they immediately began to decay, and the rotting wood furnished a breeding place for thousands of pestiferous insects which in turn destroyed the crops and thus involved still further losses.

Professor Gifford then mentioned the causes of the fires, which he said were numerous. Fifty per cent. of them were started from the railroads running through wooded sections of the country. Others were due to carelessness, either in burning off brush-wood to clear land or in otherwise starting fires without due caution. Some, Professor Gifford said, were started in pure maliciousness to satisfy some personal grudge against the owners of the land or those living in the vicinity.

Having outlined the causes and effects of the forest fires, the next point considered was the remedies to be employed in putting a stop to them in the future. Taking the principal cause first, Professor Gifford suggested that along all railroads a strip of land should be cleared wide enough to prevent danger from sparks. Along the middle of this, he said, a single line of trees might be planted, which, if kept free from underbrush and in a healthy condition, would act as a barrier and would lessen rather than increase the danger. He recommended that where there were large tracts of woods they should be intersected by cleared spaces at least the width of a road. In this connection it was remarked that most of the present fires were stopped when they came to public roads.

The speaker favored the appointment of official wardens to protect the forests and to see that the laws which now exist and those which might be passed were rigidly enforced. He also urged a strict prosecution of all incendiaries.

Dr. Rothrock, who followed Professor Gifford, opened his lecture by a few general remarks upon the uses of lumber, which, instead of diminishing, he said, were constantly increasing, thus teaching that the supply of this most important

article should be carefully protected. "But," said Dr. Rothrock, "even if we had all the lumber that could possibly be used, cut and stored away, there are other and more important reasons why trees and forests should be protected."

One of the first points taken up was the destruction of trees by the sands along the ocean, which are blown by the winds and form huge drifts, completely submerging all the vegetation. This was illustrated in different stages by the stereopticon, showing how much land which had formerly been fertile had been converted into barren wastes. The direct loss by this was not inconsiderable.

Dr. Rothrock then took up the beneficial results of trees in mountain districts. He showed views from Pennsylvania districts, at first covered by forests. A wanton destruction of these followed. Thousands of trees were cut down promiscuously for timber or by charcoal burners. In these localities, instead of the water filtering gradually through the leaves of the trees to the ground, it strikes it directly and runs down the hills, forming gullies. These gradually enlarge and grow deeper, carrying away the soil which has been accumulating for years, and in cases of heavy rain the water sweeps down in torrents and into the fertile valleys below, converting what was arable land into a useless waste, swept by rushing streams at one time and at another being dry and rocky. Nor is this the only damage arising from denuding the hills of the trees. One instance was given where from this very cause a stream flowed so rapidly that it formed a torrent, which in its course caused the loss of several lives, burst three dams and destroyed a village. The speaker mentioned a number of similar cases, the stereopticon views rendering his remarks especially forcible.

Dr. Rothrock said it was a well-established fact that forest lands hold four-fifths of all the water which falls upon them, distributing it gradually upon the soil. In cleared land, on the other hand, four-fifths of the water runs off and only one-fifth goes to the soil. Considering this, Dr. Rothrock said, the importance of trees could be readily seen as a means of distributing moisture.

In Pennsylvania it was said that in eight counties, during six years, bridges were destroyed which involved a loss of over $1,000,000. This was without counting the destruction to other property including roads and crops. In most cases, the speaker said, the floods were preventable had there not been a wanton destruction of the forests.

The relation of forests to the atmosphere was shown to be a close one, as they hold the moisture in the air and prevent, to a large extent, rapid thermal changes. Dr. Rothrock closed his address by making a plea for a more judicious system in caring for our forests.

Forest Fires and How to Extinguish Them.

BY H. NICHOLAS JARCHOW, LL.D.

Forest fires come into existence mostly by the ignition of the combustible material which is scattered over the ground in natural or wild woods. Should the ignition be confined to passing over the soil and consuming only the dead foliage and dried branches which always litter the ground, we call it a *ground* or *soil fire*. But as soon as the fire attacks the branches of the trees and reaches the canopy formed by the tops of the trees, we have to face *crown* or *top-fires*. Besides these forms of fires, cases may be mentioned where single trunks or boles, when hollow, are ignited by men who smoke out a hive of bees or a marten; and still more seldom are the cases where the soil itself being of a peaty nature is set on fire.

Forest fires are seldom caused by natural forces. In most cases they are due to imprudence or negligence of man by lighting fires in the woods or near by. A good many fires are caused, only indirectly by human agency, from the sparks emitted by locomotives on railways which run through wooded tracts. But the number of cases of incendiarism, from mischief or out of revenge, are unfortunately in our country not rare.

As for the localities endangered principally by forest fores, the nature of the soil and the situation of the woods are

the main factors which determine the extent of the injury, because on these the character of the soil covering and the species of trees growing there is dependent. Inferior soils, with their dry covering of coarse grasses and herbage, are of such deficiency in soil moisture that the scrubby growth soon becomes dried up in early summer and are much more threatened with danger from fire than fertile soils with a strong growth of succulent plants and grasses. As a rule, the areas with inferior quality of soil are mostly occupied by conifers, resinous trees, which of themselves are much more subject to danger from fire than the broad-leaved deciduous trees, more especially as regards the top or crown fires. From these, the latter suffer only during the earlier stages of growth, when they form thickets and dead foliage is still hanging on the branches. The vast stretches covered with young conifers, where the soil and its covering are not only usually dry, but where the trees themselves are of an inflammable nature, invite forest fires in a most undesirable degree, and as soon as these *ground* fires have originated, it will take not a long while before the lower branches and twigs of the young trees are attacked by the flames, and the entire forest will be devoured. Old pineries, where the trees have parted with their branches and kept only their canopy, suffer not so much from *ground* fires, but are exposed to *crown* fires. This danger diminishes with the increase in the growth of the trees, because the combustible material in the needles in the canopy is getting every year more isolated, and by the natural growth of the trees retires steadily more distant from the ground, the common place of the origin of forest fires. Large, compact natural reproductions of pineries enhance the danger of spreading of fires that may break out, and at the same time make their extinction a matter of increased difficulty.

Although our natural forests are annually visited by the most disastrous conflagrations, there exist—with the exception of some provisions regulating the running of railroads through woods—nowhere satisfactory measures either for preventing or extinguishing forest fires. To become acquainted with such measures we have to look into countries where the forests are utilized by systematical management, and where the forester not only produces and reproduces useful and valuable material, but also sustains and possibly improves the tree-growth. There we find preventive measures against forest fires taken by *owners of woodlands*, partly to obviate the occurrence of fires, and partly to prevent their spreading to any considerable extent when once they have broken out. Of these measures we point out the following :

(1.) Prudent conduct of all operations within the woods, for the purposes of which it is necessary to employ fire. Hunters, woodmen and laborers should be *thoroughly* impressed with the necessity for prudence in case of lighting a fire.

(2.) The lanes, pathways and roads running through forests should be kept clear of all inflammable material, as dead branches or twigs, etc.; and green lanes should be mowed often to prevent growth of long and dry grasses.

(3.) Where railways run through woodlands, fire-lanes should be run parallel to the roadbed ; that is, naked strips of ground, from ten to fifteen yards wide, planted with broad-leaved trees, or even with fruit trees, if the soil is adapted to them. The ground of these lanes should be kept free from any inflammable material, so that the sparks of the engine, when not intercepted by the non-combustible foliage, do not find on the ground any matter which could catch fire.

Extensive pineries on sandy soil are principally endangered by fire. Here it is of the utmost importance that the whole area should be divided in tracts or compartments of moderate size—from 800 to 1,000 feet wide—by lanes or paths which ought to be carefully kept clear of inflammable material. This can be done cheaply by plowing or harrowing the ground now and then, thus destroying every vegetable growth. The width of the lanes is from four to six yards. They

are sufficient to stop the progress of a *ground* fire; while in case of a *top* or *crown* fire, they can be used as convenient places for commencing operations to prevent the fire spreading into other portions of the forest. Wherever the danger of fires is greater than in common cases, in Germany separate fire lanes are formed throughout the entire pine forest, and these lanes being wider than the usual lanes (schneissen) are on both sides planted with a wide belt of some broad-leaved trees, which in case of a crown fire does excellent service in stopping its further progress. In planting such protective rows or belts, the birch is mostly resorted to, as this species of trees is satisfied with the poorer classes of sandy soil. But oaks may also be employed for this purpose wherever the underground is not made impenetrable for their tap-roots by hard pan. But even where oaks only as coppice-wood succeed, they perform good service in protective belts, tending to stop the progress of fires. In laying out these lanes it is important to pay the proper attention to the prevailing winds so that these strike the fire lanes laterally.

Speedy information in regard to the occurrence of a forest fire is of the greatest importance, so that measures for its extinction may be taken at once. For this reason, in large coniferous forests on the North-German Plains special watchers are maintained in watch-towers, whenever there is a long drought in winter or summer, and cow-horns are blown from these as soon as any suspicious smoke is seen; while the church bells of the adjoining villages ring a continuous alarm, and at daylight a red flag is hoisted to the top of the spire, which at night is replaced by a far-shining lantern, directed to the place of fire. All this is done in order to call together whatever body of men is available for the purpose of taking measures to counteract the spread of the fire and to accomplish its extinction.

J. H. H., in the *Tropical Agriculturist*, states that Eucalyptus trees in Jamaica grow to a height of sixty feet in seven years! Records of the department confirm this statement.

Religious Vandalism.

From the Forest Tree Planter's Manual.

Says the *New Jersey Forester*: 'The growing of Christmas trees for market would be, if properly conducted, a legitimate and, no doubt, profitable business. Although the custom is time-honored and gives pleaeure to children for a few days, it seems a shame to sacrifice thousands of beautiful young trees for such a useless purpose. There is hardly an old field in Southern New Jersey which does not show the work of Christmas tree thieves. They cut down the thriftiest cedars as soon as of a marketable size and cut the tops out of full-grown trees. All this is to celebrate a custom, the meaning of which nobody exactly knows. The city of Paris uses 40,000 Christmas trees each year.'

The timely suggestion of the *New Jersey Forester* is what the writer of this has all along advocated, especially in his last report. Were we not right? Millions upon millions of young and most beautiful spruces and balsam firs are annually cut and shipped in carloads over the Northwest, supplying even Chicago. This destruction of our most promising trees passes for a proper celebration of a religious anniversary. Let us not discount its beautiful significance, but if we must use trees, *then raise them for the purpose* and stop churchal vandalism upon what is absolutely needed to preserve our evergreen forests.

Forest Tree Planter's Manual.

We have just received an instructive and interesting booklet from Minnesota. It is called the *Forest Tree Planter's Manual*. The writer of this manual is Mr. J. O. Barrett, secretary of the Minnesota Forestry Association. The expense of its publication is borne by the State. It is free, therefore, to every citizen of that Commonwealth who sends stamps to pay the postage.

How foolishly men destroy the forest cover without any regard for consequences, for thereby they rob themselves of wood and water!—*Humboldt.*

The Landes from the Beginning of their Exploitation.

From L'echo Forestier.

Who has not heard of the 900,000 hectares of sandy moorlands between the Gironde and the Pyrenees? Even after the labors of Bremontier, who explained the method of arresting the invasion of the sands along the seashore, the French *Sahara* remained almost undeveloped. Persistent attempts failed to overcome the difficulties of the undertaking.

Up to 1850, before M. Chambrelent commenced to plant, numerous attempts met with complete failure. These failures had been such that when in 1850, having made a study of the country for twelve years, M. Chambrelent made known the means of removing the sterility of the soil at once, his views were rejected by everyone, so that he was obliged to purchase 500 hectares of land from the *Communes*, in order to carry out his plans at his own cost. Five years later, in 1855, several land-owners adopted his methods, and applied them to more than 20,000 hectares.

Some time afterwards, MM. E. and I. Pereire and M. Jaral undertook the work on a much larger scale. They did not attempt to introduce a complete system of agriculture, but only to produce that which was adapted to the soil. After having laid out their very extensive property in tracts, they commenced to build roads, to dig canals, and to plant pines. Up to this time the planting of trees had been quite unsuccessful, and for this reason their very excellent method of exploitation had scarcely ever been applied. The soil of the *Landes* is principally sand when not entirely so, and is underlain by a stratum of impervious gravel, so that planting is possible only in midsummer after the sun has evaporated the moisture. If the planting is done too early, the seed rots; but if planted later, the seed is injured by the hot sun. This double danger has been overcome by M. Chambrelent, by his system of drainage, consisting of small ditches which carry the water into the canals. By this system of drainage it is possible to plant as early as the month of March, and the vegetation becomes vigorous enough to withstand the heat of summer. Since this time planting has very considerably increased.

Very much encouraged by his first success, the skillful engineer has endeavored to improve a larger territory. He has discovered that the soil of the *Landes* will support other kinds of vegetation than pines. Being protected from winds by the pines, oaks will grow in certain favored localities. In fact crops that need more careful cultivation can be produced. In some places the cultivation of rye is successful, and what is more remarkable, such crops as maize and tobacco, which are very exacting in their demands on the soil, may be successfully grown. At the present time, the aspect of the *Landes* is completely changed; but to return to the time of which we are speaking, M. Chambrelent did not regard these products as necessary to the success of his undertaking. He was content with pineries which were productive at the end of the fourth year. The young pines reached a development at this age which rendered thinning necessary. These thinnings were continued annually until the trees were full grown.

The little pines at four years of age proved very useful for vine-props. When larger they were used for the same purpose, having been split, and, according to the local expression, *bled to death* (saignes a mort) in order to extract the resin. Those suitable for telegraph poles were treated in the same manner, and injected with sulphate of copper, and those fitted for saw-stuff furnished boards, planks and railroad ties.

It is quite useless to further emphasize the advantages which have resulted from this wise and ingenious exploitation. No one will be surprised at the benefits of which this has been the source. Resin is not the least important of these products. The English, who supplied themselves from America before the Civil war, come to-day to Bordeaux and Bayonne to buy at a high price the resinous products of this region, prepared by the Hugues process, and also timber for their mines. In exchange, they bring coals, which

increase the industrial activity of the country.

Such have been the beginnings of the exploitation of the *Landes*, of which M. Chambrelent has been the true pioneer. He has indeed given a new province to France.

Forest Fungi.

THE "CEDAR APPLES" AND COMMON APPLES.

The following questions have been sent me by one who is largely interested in both the cedar trees and the apple orchards of New Jersey:

Does the fungus *Gymnosporangium macropus*, commonly called "cedar apples," on the red cedar, occasion serious damage to apple trees in the vicinity? Would you recommend planting red cedars in the region of apple orchards? Would you advise farmers to cut down their cedars if their apple crop is affected? How far in your opinion is this fungus carried?

In some parts of the State the "cedar apples" are very abundant, and the fungus causing them, in one of its stages thrives upon the apple trees. It is therefore natural to ask a question like the first one given above. There is a direct causal relation between the cedar apples or galls familiar to many as brown swellings of the stems which bear long, orange gelatinous horns during wet weather in spring. The spores from these orange horns, when dry, are carried by the winds to the young leaves and opening buds of the apple trees in April and May where they grow and produce the rust of the apple leaf, and sometimes of the fruit as well.

In some parts of the State the cedars are so badly infested with the galls that when apple trees are near by the latter may have the foliage and fruit badly injured. Whole orchards, of hundreds of trees, have been seen by the writer which were badly rusted. In such cases the cedar trees were abundant, close to the orchard upon one or more sides and thickly covered with the galls. Where orchards are thus infested, it goes without saying that the cedars must be cleaned of their galls or removed, or else the apple crop is in danger.

In answer to the second question, it seems to me wise not to bring the cedar and the apple trees close together by planting cedars near to the apples. If one was sure that the cedars would remain free from the galls the case would be different. Besides, the cedars harbor other species of the genus *Gymnosporangium*, to which the galls above considered belong. Thus, one species when it goes from the cedar, where it does not produce galls but thickened growths of the branches instead, to the quince it causes the orange-colored rust of the quince fruit, and in some places it is quite destructive.

As a general rule it may be stated that cedars had better not be planted near orchards.

The third question carries with it an answer that is more definitely stated. If the orchards are affected at all seriously by the rust it is wise to remove the cedar. For what distance should they be removed, or in other words, how near to an orchard should the cedars be permitted to remain is not easy to state. The spores will be carried by the winds for long distances. The nearer the cedars the greater the chance of the apples taking the rust from them.

If an orchard is badly infested it would be best to remove all cedars within a quarter of a mile of the orchard.

No hard and fast rule can be laid down in such matters. Much depends upon the abundance of the fungus, the value of the orchards, and that of the cedars. Sentiment is no small factor in the question. It is also possible to think of places where cedars grow well and apples do not, and the former may be more profitable than the latter.

BYRON D. HALSTED.
NEW BRUNSWICK, N. J.

A Simple Remedy.

When cut in the woods cover the wound with fresh ashes. There is no handier and more efficient antiseptic. If no large vessel has been severed it will stop bleeding. It has been successfully used on the battlefield, especially by Japanese soldiers.

Reclaiming Sand Barrens.

The Massachusetts Board of Harbor and Land Commissioners have the care of the Province lands at Provincetown, Cape Cod. Last year the board associated with its superintendent, James A. Small, in an advisory capacity, Mr. Leonard W. Ross, a landscape engineer, who gives his services gratuitously, and once a month these two meet the board for consultation in planning and directing the progress of work at Provincetown.

The history of the reclamation of sand barrens by the sea in other parts of the world shows that the loose sands may be not only fixed, but in time made productive, notably the lands or heaths of Gascony, containing about 1,709,000 acres; the Campine in Belgium and Holland, containing about 350,000 acres; the lands in Denmark, in Western Jutland, where, in 1854, there were 3,614,720 acres, mainly of turf and sand dunes, and where the experiments of the past twenty-seven years have so covered this sand area with vegetation that there remain to-day only about 1,581,653 acres unreclaimed. There the system of nurseries has proved a great success, their great value being that the plants are started in the same kind of soil into which they are to be transplanted, and exposures incidental to long transportation are avoided.

As conditions of climate and exposures vary, so also must the selection and treatment of the grasses, shrubs and trees, by means of which the sand dunes of Cape Cod are to be reclaimed, and experience alone will ultimately determine what will thrive best in that particular locality. The severity of last winter was very destructive to the plantings of the previous season, and the Scotch broom, poplars and willows planted in exposed places suffered greatly. In the light of that experience and further study during this past year the commissioners have been planting beach grass along the sands under the lee of existing vegetation and on the northern range of sand hills until an area of about thirteen acres has been covered. This has taken root readily and already gives promise of its ability to resist the sand storms. There were also set out at the foot of the slope about 2300 willows of various kinds, 1000 or more silver poplars and some 2500 pines. In addition to the foregoing, about 20,000 willow slips have been set down among the beach grass.

In connection with this work it has been found desirable to establish a nursery for bringing forward young plants, slips and seedlings to a growth that would better enable them to withstand the exposure incident to their permanent planting, and also to have at hand a supply of stock of the right kind for transplanting at the lowest cost. There are at the present time growing in the nursery from 200,000 to 250,000 young trees of the following kinds: Pine, locust, alder, birch, hornbeam, ailanthus and maple, of which the larger part are pines, as being especially adapted for the uses intended. In addition, there are 30,000 to 40,000 shrubs of the privet thorn and Scotch broom. All these will need another year's growth in the nursery, and then the commissioners expect to have an annual supply commensurate with the wants for transplanting.—*Northeastern Lumberman.*

The Province lands belonging to the Commonwealth of Massachusetts in the county of Barnstable are similar in nature to the region along the shore of New Jersey. It is interesting to note in this connection that the harbor and land commissioners who have charge of the Province lands have begun to improve them. New York and New Jersey ought to fall in line and at least do something in the way of fixing shifting sands along the shore.

By destroying the contrast between field and forest you will take from the German people its principle of life. Man does not live by bread alone. Even if we should need wood no more we should need the woods. Even if we should no longer require the dried products of the forest to warm our bodies we should still require the living forest to warm our souls.—*W. von Riehl.*

Forest Friends—The Birds.

BY NEWLIN WILLIAMS.

The extensive investigations of the Department of Agriculture with regard to the food of our avi-fauna have exonerated many birds which have long been thought nuisances in orchard and forest.

Notable among the forest birds are the various woodpeckers—the downy, the most common, the hairy, the red-headed, the yellow-bellied and the pileated woodpeckers and the flicker, besides a number of rarer varieties. Of all the genera and species but one can be called harmful. This is the yellow-bellied, commonly known as the sapsucker, in whose stomach is almost invariably found the tell-tale cambium layer of certain tree-barks. His drill marks we are familiar with on apple tree trunks, passing quite around the bole in regular series of rings. Dr. C. Hart Merriam notes the punctures on apple, thorn-apple (*Cratægus?*) and mountain ash, but finds they are not drilled for the sake of the sap alone, since the bird returns in a few hours to feast on the bees, ants and other insects which have by that time gathered plentifully to revel in the flow of fresh sap. To this list of trees attacked by the sapsucker the late Frank Bolles has added the canoe birch, red maple, red oak and white ash. I have noticed borings singularly like them on the Austrian pine, though I did not detect the bird at work. Mr. Bolles did not mention the return of the bird for insects, but added that, though the girdling is apt to kill the tree, the total harm done by the attacks is too insignificant to go on record.

As for the other woodpeckers, the downy makes three-fourths of his diet of insects, chiefly wood boring, and the remaining portion of wild seeds and fruits. The hairy and pileated woodpeckers, the flicker and the red-headed woodpecker, eat insects in decreasing and vegetable food in increasing proportions, the flicker dining like an epicure from an immensely long menu of wild delicacies. Their young are noted tidbits. I remember once getting my arm so badly fast in a flicker hole in a cherry tree that the hole had to be enlarged before I could get free.

According to the reports of ornithologists, the pileated woodpecker is a retiring member of the family, strictly a forest bird. He has wondrously developed muscles and a steely beak, so that he can work incredible havoc exploring old stumps and dead limbs for borers.

On a grand average, then, the woodpeckers are loyal friends of the forester.

I have never noticed that the annual harvest fly, or *Cicada*, destroys the terminal growth of tree branchlets, nor does he appear to feed on anything, but the desolate autumn which follows the incursion of the seventeen-year "locusts" is familiar to all of us. The whole corps of birds is inadequate to cope with such a plague of insects. But I remember having seen many doing their noble best. Even the English sparrow ventured occasional aid, snatching the humming fly from his warping course and beating him to pieces on the hard sod or the roadbed. This cicada must be a dry morsel, for behind his armor and goggles seem to be only vacant spaces for the reverberations of his empty noise. A grasshopper were past juicy in comparison.

We have very few resident birds who can avoid a trifling share of blame for spreading sumacs, both innocent and poisonous, the two species of the latter having such baneful effects on persons with thin skins, and the twining trunk of poison ivy choking to death many a tree just entering the prime of its life by a luxuriant and insistent growth. The crow is especially partial to these, and his wide journeys from forage fields to roost are especially adapted to effect the dissemination of the seeds of genus *Rhus*. He seems to find the poisonous varieties more especially to his taste, and, if the seeds be poisonous, such immunity must have long since been established in his black body as to render his serum a valuable antitoxin if the law of the distinguished Frenchman is to be widely practicable!

Astringent and bitter fruits have found favor in the eyes of the crow, because,

poor fellow, the winter provides him nothing better. What wonder he rushes on the corn at sprouting time and tears the stacks occasionally!

I would we could cite some plentiful bird extravagantly fond of the caterpillers which pitch such unsightly tents upon all our natural bitters,—walnut, wild cherry, apple, herb-boneset,—and send out bevies of marauders to feed on the vital foliage till the wild cherry is quite skeletonized, and the walnut finds the fall a hollow mocker, with nothing to shed but yellow curled-up petioles. The boon which shall free us of these has not yet appeared, though many of the birds take decided aggressive measures. It is a clear case of survival of the fittest. I would not want to swallow a wooly caterpillar myself while there were yet smooth cherries on the tree, and angleworms channeling the surface of the cornfield after every rain. So, if the farmer had no grain or fruits, and did not till his field, the birds would seek still larger numbers of wild berries and insects out of the grim law of necessity. We might consider the trifling annoyances and depredations we suffer from the feathered tribe as a just tax upon our civilization and superior mental endowments.

The acrobatic little nut-hatches cling affectionately to the tree trunks, often head downward, and, according to Dr. Warren, destroy tree-inhabiting beetles and other insects which shelter in the crannies of rough bark. They have often been found hammering at chestnuts, beechnuts and acorns, which they have wedged into a crevice in the bark as into a vice, for convenient manipulation. We may guess that their food is partly of kernels, and how they get their name.

Jays usher in the autumn with their calls, and being so busy at this season without doubt drop many an acorn and chestnut from their beaks to engage in the more tempting pursuits of scuffles or brazen altercations. Then, owing to their secretive habits, a store of nuts may be forgotten in the favorable soil of some uncared-for fence corner, and a seedling springs up in company with sassafras and hickory, and perhaps a persimmon, whose seeds had been left by an opussum lingering there to eat the wild frosty fruit before skulking away into hiding at sunrise.

The fly-catchers are a very useful family, save that some of them are a little over-fond of honey bees, and the warblers are a veritable army of benificence, it is said, so they should by no means escape notice.

The visible results, good or ill, which we may assign to our common birds, are probably a thousand times outweighed by their noble offices in the matter of prevention,—the matter of preventing a decimating close-fertilization in our blooming orchards, of the destruction of gall wasps, it may be, and more especially of decreasing the grand sum of harmful insect life in all stages of development.

The Forests of North Carolina.

We have just received two very interesting and valuable publications from the North Carolina Geological survey: Bulletin No. 5, *The Forests, Forest Lands, and Forest Products of Eastern North Carolina;* and Bulletin No. 7, *Forest Fires: Their Destructive Work, Causes and Prevention.*

The condition of forest affairs in Eastern North Carolina is very similar to that of the coastal plain of New Jersey. There is a very great deal in these pamphlets of interest to Jerseymen, and it is only a lack of space that prevents us from quoting more freely from them in this issue.

In speaking of the white cedar, Mr. Ashe says:

"White cedar, which usually occurs with white bays in small swamps or in clumps in other swamps, flourishes only on a peaty or very sandy soil which is largely mixed with organic matter. These soils are unfit for agricultural purposes and their fertility is easily destroyed by fire during very dry seasons, especially where the dried *debris* resulting from logging fills the woods. Unless these swamps are burnt out a growth of the same species is most likely to replace the white cedar after

lumbering, but in the event of a fire the white bay (*Magnolia glauca* L.) will succeed and usually retain possession. Although white cedar is very valuable, grows rapidly, and there is only a comparatively small amount in the Eastern United States, these swamps are from carelessness frequently burnt and the chance of a regrowth thus destroyed."

The same applies to Southern New Jersey where the white cedar is being rapidly replaced by maple, magnolia, and other less useful trees.

On another page he says:

"White cedar (juniper) is now recognized as one of the most valuable woods of the eastern United States, and decidedly the most valuable in the eastern part of North Carolina, where it has a large and constantly increasing number of uses. It is employed for making cooperage ware, pails, tubs, railroad tank plank and boat plank, shingles, sashes, railroad ties, telegraph and telephone poles and for fencing. All of these services to which it is put are based on the property it possesses of withstanding exposure to moisture, or alternate wetting and drying, and its small shrinkage. In this State it is also used in the manufacture of cheap furniture, and is said to be particularly suited for such, being easily worked, shrinking very little, and being light."

In the bulletin on Forest Fires, he says:

"By far the greater number of the fires, at least two-thirds of them, seem to be of intentional origin. And at least two-thirds of those purposely set are to secure or improve the pasturage. In the eastern part of the State these spring fires burn off the tough and thick old growth of wire-grass and broom-straw and the cattle can very early in the spring for several weeks get a fairly good pasturage. The grass, however, soon becomes too hard to be eaten. In the mountains fires are set to get rid of the leaves, so that the young grass can be easily reached in the spring; to burn off the stiff weeds, etc., and what is much more important to the grazer, keep the young tree growth killed down. Keeping the young tree growth killed down exercises a two-fold influence; it keeps the woods open so that grasses and herbage can grow, for these will not grow where it is too shady; and it keeps all pines and other conifers killed down, as these do not so readily sprout from the stump; while keeping them killed keeps the hardwoods, which cattle eat, of low growth, or always sprouting from the roots, so that they afford young and tender shoots within easy reach of cattle. It must be borne in mind, however, that these fires also destroy much of the grass and other annual and perennial herbs and shrubs, by destroying both the seeds and the plants themselves, in the forests and about the margins; and that in this way in the long run the pasturage in the forests is injured rather than improved by these repeated burnings.

Burning to protect houses, etc., is said to be a frequent cause for firing in the south-eastern counties. These are fires set on still days to get rid of the inflammable material, so that there will be no danger to farms and crops and houses from a chance fire in windy weather. A few fires were reported as set to enable hogs to find mast; and some by chestnut hunters; some from malice. In the turpentine orchards they are intentionally set to keep the growth down and get rid of the inflammable grass before the boxes are cut, or the sap begins to rise in the trees. Some were said to be set to get rid of insects, pine borers, etc, which is certainly using a very dangerous remedy for an insignificant evil.

Still other fires were reported as being started to drive game from cover. Most of the fires in the eastern and many in the western part of the State are started by indigent persons who are amenable to no law, who regard all property as open to destruction and forests as communal property; persons whose parents were hunters and who themselves are scarcely yet seriously affected by the civilization which defines property and allows to the individual its possession. The few fires that were reported as being of accidental origin were from hunters at night, campers, locomotives, lightning, and many from burning brush or logs in clearing land."

Fortunately, the forests of New Jersey are not destroyed by pigs and cattle as in North Carolina. In referring to this, Mr. Ashe says:

"If the destruction by swine ceased with eating mast there would still be sufficient seed left to reproduce some parts of the forests, as the mature trees are gradually thinned out, for one-year-old seedlings are common twelve months after a heavy mast. No sooner, however, has the young pine gotten a foot high and its root an inch in diameter than the hog attacks it, this time eating the roots, which, until two inches in diameter, are very tender, juicy, pleasantly flavored and free of resinous matter. In the loose sandy soil the piney woods hog, or "rooter," finds little difficulty in following and devouring the tender roots to their smallest ends. Many small trees are destroyed in this way. And cattle, furthermore, are said to bite off frequently the tops of the small plants, and with them the terminal buds, in the early spring. This is doubtless done while grazing, more accidentally than otherwise."

Forest Fires.

From Mechans' Monthly for March.

It is many years now since the senior conductor of this magazine pointed out that nothing could possibly save American forests from serious conflagrations but some well-directed effort to get rid of dead brushwood, which everywhere abounds. It is pleasant to note that this seed sown so long ago is now bearing fruit. Secretary Morton has distinctly stated to one of the Forestry Conventions that there is absolutely no other hope of saving a forest from fire than the removal of the dead brushwood, and this idea is now being taken up in forest articles in newspapers and in speeches in conventions. In the early part of the season it was stated that the losses by forest fires in New Jersey would certainly come up to two hundred thousand dollars. Then it was stated that if the State of New Jersey were to appropriate two hundred thousand dollars for the employment of forest wardens it would be a cheap thing to do. These forest wardens are to have nothing to do but to sit around and wait for the beginning of the fire and then put it out. If a hundred thousand, or only fifty thousand dollars, were spent in removing dead brushwood, which feeds the fire, the money would be better spent. But the universal weakness of our people is to think that nothing can be done unless the State has a "finger in the pie"—not only in forestry, but in many other good efforts. The true forestry policy should be to encourage private enterprise. The State might give a bonus for the best cared-for forest after a certain number of years, and it might relieve forest lands from their share of taxation. In many ways it could be made the interest of owners to plant forests and to care for those which are worth caring for. To our minds, the talk of the forest wardens and similar State expenditures are all labors at the wrong end.

I agree with the editor of *Mechans' Monthly* that it is essential for several reasons to remove *deadwood* from the forest. This has been strongly urged for many years by all professional foresters. It is also essential to obtain the co-operation of the woodland owners. The accomplishment of the first, however, will help, but will by no means stop fires in New Jersey. At Lakewood all underbrush and deadwood were removed from the pines, and they have grown very little since. It was only by hiring watchers that fires were prevented. *Living underbrush*, which is essential to the growth of the forest, burns freely in summer in the pinelands of New Jersey. Vast areas are covered with low oaks, to which the leaves cling until late in the spring. Later in the summer the muck in the swamps becomes as dry as punk. It would be only practical to remove combustible materials from the sides of rail and wagon roads and along fire lanes and to burn all the debris in winter which has been left by choppers, but to go through our woods and remove all combustible underbrush would be like stopping the leaks in a barrel and leaving the bunghole open.

The construction of the proper kind of fire lanes is the first step toward the prevention of forest fires. It is certain, also, that wardens are needed for at least a part of the year to apprehend and bring to court incendiaries and careless individuals, to see that the laws in relation to the removal of debris, construction of fire lanes and burning of brush are enforced; also to superintend the extinguishment of fires. For at least six months of the year he will have something more to do if he does his duty than "*sit around and wait for the beginning of a fire.*" There are several men in Southern Jersey who did not have their clothes off for two weeks last summer in consequence of fires. Some days four fires were burning within a radius of ten miles at the same time, and there was not a day, when the woods were not wet, when at least one fire was not burning.

The prevention and extinguishment of fires is a difficult matter. It can be accomplished only by the co-operation of railroads, a large majority of the woodland owners and public-spirited citizens, coupled with the aid of the proper kind of laws with ample means for their application.

To sum it all up, fires can be reduced to a minimum by removing the causes. Many of these causes are avoidable and will not exist if there is the proper kind of laws with ample machinery for their enforcement. The few fires which are unavoidable can be extinguished in their incipiency if there is a warden present who knows just how and what to do.

A F. W.

A Plea for a Rational Method of Laying Out a Seaside Resort.

On a recent visit to Avon, on the Jersey coast, on a cold, blustery day, I was forcibly impressed with the ameliorating effect upon the weather of a strip of woods, particularly if left in their native state. The proprietor of this resort has had the good sense, and good taste as well, to preserve as much of the woods as possible. On leaving the depot on that day a keen, cutting westerly wind was blowing, making one button his coat up tight. A walk of a quarter of a mile brought one among the pines. There the wind could be heard among the tops of the trees, but in the street there was but a light breeze, and the effect was almost that of an April day. The change was almost magical, and it would seem that no thoughtful person would think of disturbing that which both in winter and summer is a perpetual feast to all true lovers of nature.

The economical side is also well worth considering. I doubt whether any person ever goes to the Jersey coast out of pure love for the glaring sands, and the relief furnished by a strip of woodland is very great. Many persons, also, are fond of hunting the wild flowers which grow so profusely along the shore. To such the destruction of the woods takes away one of the greatest attractions, as many species of the wild flowers disappear with them. Quite recently some so-called *improvements* have been made in which the very first step was to cut off every tree and every shrub, leaving nothing but a waste.

Another branch of the subject not quite so appropriate for your paper is that of grading. Even engineers forget, sometimes, that by far the most economical arrangement of grades, and for cottage purposes eminently the most pleasing, is to be obtained by following as far as may the natural contours and grades. In one conspicuous instance a steam excavator was used for weeks in cutting great canals for streets through a beautiful rolling bluff, making it difficult to get down to the street from the lots, spoiling the natural drainage and incurring a cost far exceeding what was necessary. I see no reason why the streets for such purposes should always be at right angles, provided proper attention is paid in the lay-out to convenience in communication. If this principle be admitted, much of the arbitrary disturbance of nature's grades will be unnecessary. In any case, very many of the streets at the seashore resorts are made too flat. They are not pleasing to the eye, and water from the heavy showers or rains occur-

ring does not run off freely enough and gutters and sidewalks are often flooded. A part of the expense of grading expended in a proper system of sewerage, with frequent inlets to prevent washing, would bring infinitely more satisfactory results and be an attractive feature to prospective residents.

It may be pertinent to add that the services of a good landscape architect or an engineer experienced in such matters will always be found to pay, but he should be consulted at the beginning before irremediable mistakes have been made. F. C.

The Virginian Dismal Swamp.

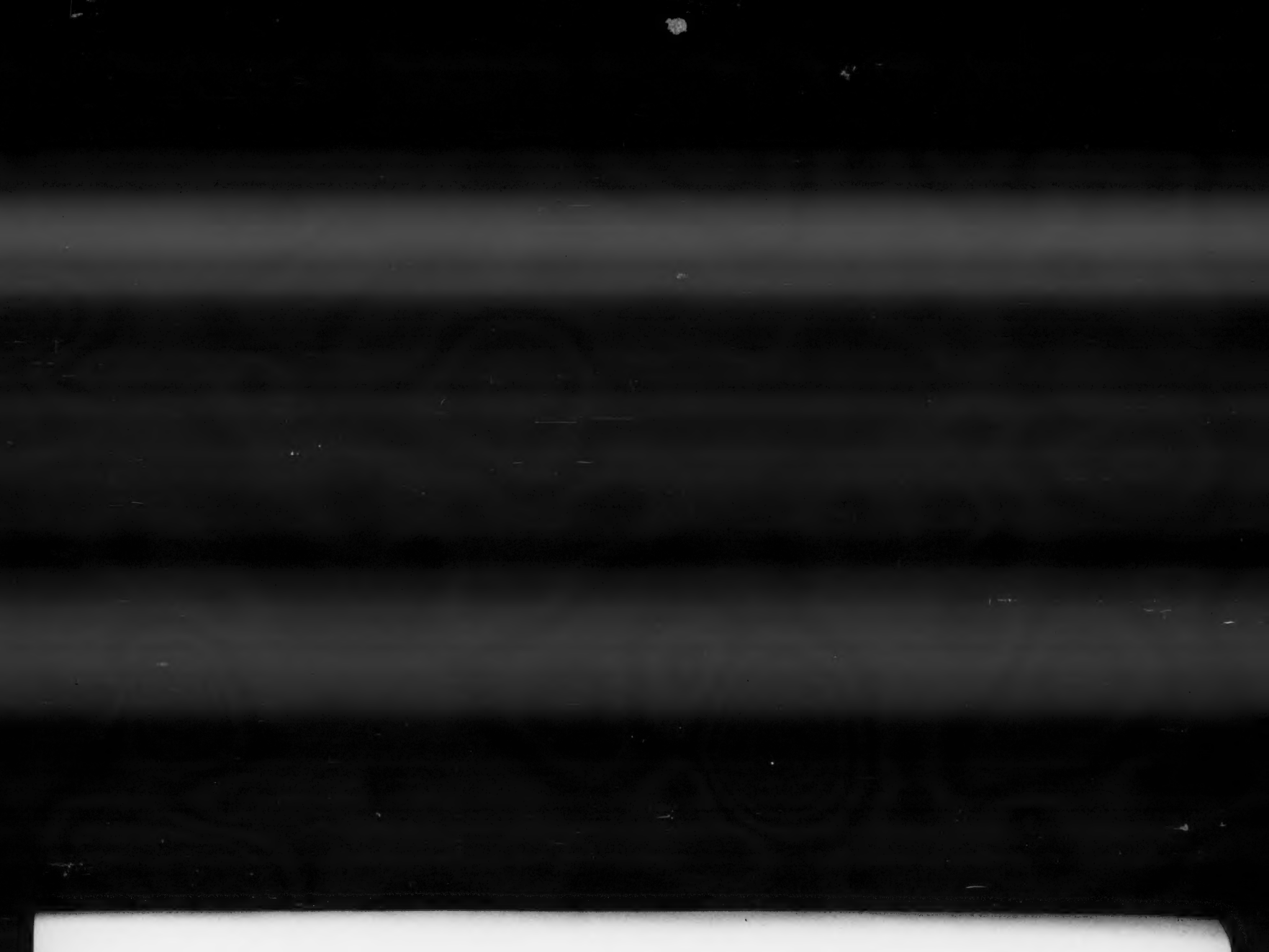
The following interesting account of this famous locality is from the Washington *Star*: "There is fine fishing in Lake Drummond, which contains plenty of perch, black bass, two kinds of pickerel, three species of sunfish and other panfish. There is no dry ground in the swamp, and one sinks at every step to his knees in mud. The cane which forms brakes all through the South is abundant. It is tangled with vines that run up into the trees, so that half a mile an hour is a good rate of progress. One must carry a knife to cut the vines, walking being further impeded by the catbriar, whose thorns catch in the clothing and hold on like hooks.

"The boats used in the Dismal Swamp are all dugouts, made from cypress logs, twelve feet long and very narrow. To shape such a craft properly is a nice piece of work. The novice who steps into one of these boats is apt to go out on the other side, but the native stands up and paddles with security. The water is darker than amber and excellent to drink. It is said to be a sure cure for malaria. There are no malarial diseases in the swamp.

"The swamp is full of magnolias from the size of bushes to trees sixty feet high. When I was there they were full of flowers. The cypress trees are cut for shingles. The best trees for the purpose are those which fell from twenty-five to fifty years ago and are now covered with moss. The negroes wade in and cut off the moss and rotten bark. Then they cut up the log into shingles on the spot. The next best tree is one that is newly fallen, and the third quality is the tree that has to be felled." The absence of malaria is remarkable.

In his description of the Adirondack black spruce, Mr. William F. Fox says that years ago it formed a large part of the forest which covered the Catskill Mountains, but was rarely found in the western part of New York State. In New York it attains a common height of 80 feet, with a common diameter of 18 inches, and a maximum height of 105 feet, with a maximum diameter of 36 inches. It prefers a hilly and mountainous region, with an altitude ranging from 1400 to 1800 feet, and, while it is found at its best on mountain slopes, it grows readily in low, swampy valleys. The sapwood, which is generally of a lighter shade, or a pure white, is about two inches deep in trees which have attained a diameter of 20 inches or more. The smaller trees have a thicker sap proportionately. It weighs about 28 pounds to the cubic foot, and, when perfectly dry, 25 pounds. Spruce pulp wood cut on high land, partly seasoned, will weigh about 3800 pounds per cord; that cut on low or swampy land about 4200 pounds. Spruce is to be found mainly in Maine, New Hampshire, Vermont and New York, and in Canada, where it extends northward to Hudson Bay, and southeasterly through New Brunswick and Nova Scotia. It is found in a mountain strip through West Virginia and sparsely in Pennsylvania, and in a narrow belt as far west as Wisconsin.—*Northeastern Lumberman.*

In Rhode Island any person who plants more than one acre of forest trees, not less than 2,000 to the acre, on land not worth more than $25 an acre, is free from the payment of taxes on the property for a period of fifteen years after the trees have reached an average height of four feet.—*General Laws, Section 3, Chapter 44, 1895.*



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